New Jersey Core Curriculum Content Standards
for
Technological Literacy

INTRODUCTION

The Vision

Technology was identified as an essential workplace competency by the Secretary's Commission on Achieving Necessary Skills (SCANS) report in 1992. Technology is any modification of the natural world designed by human beings to solve human problems, enhance human life, or extend human capability. SCANS stated that students should be able to select equipment and tools, apply technology to specific tasks, and maintain and troubleshoot equipment. The Department of Education recognized this by including technology in the original cross-content workplace readiness standards. In keeping with today's technological society, technological literacy has been further emphasized by its inclusion as a separate standard area which focuses on both information technology and technology education.

Information, systems, and technology as defined in the SCANS report are evolving at an amazing rate, with both frequent advancements of existing technologies and the creation of new technologies. All students must understand and be comfortable with use of computers to process information, select equipment and tools, apply the technology to specific tasks, trouble shoot the equipment, analyze the systems, and design new strategies and equipment to improve the system. All students need to be able to use basic computer skills in the application of software packages to school, home and employment situations. By introducing systems, learners understand social, organizational, and technological systems so people can monitor and correct performance. The understanding gleaned is used to design or improve the system. The understanding of technology design and systems helps learners to function in today's complex society, and become informed and productive adults of tomorrow.

Information Technology

Information technology which supports skill-gathering, information-organizing, and problem solving, has become critical for every student whether college- or workplace-bound. Colleges and employers are now demanding that students and employees possess a broad range of technology proficiencies. More and more retail purchasing is being done on-line every year, and all but the most menial of positions now require a significant understanding of information technology. To ensure that students are literate in the use of information technology, a separate standard that defines rigorous, in-depth learning has been included. **The information technology standard is designed to be integrated and applied in all of the Core Curriculum Content Standards.**

Technology Education

The **technology education** standard was developed to ensure students understand any modification of the natural world designed by human beings to solve human problems, enhance human life, or extend human capability in a highly technological world. It is linked to the Science Standards 5.4: Nature and Process of Technology in Science. Business and industry has clearly stated the need for technological skills in the workplace of the 21st Century.

This standard is based on the *Standards for Technological Literacy (STL): Content for the Study of Technology (ITEA, 2000),* developed as part of the National Science Foundation (NSF)/National Aeronautics and Space Administration (NASA) funded by the *Technology for All Americans* (TfAA) project.

A study by DeKlerk has found that students form negative attitudes about the technological world if there are no formal technological experiences. This finding is a great concern to New Jersey business and industry. Other cognitive research suggests that "design-based learning" is important. Early studies with design and technology (engineering) curriculum show that students who learn important technological concepts develop positive attitudes about technology, math, science and learning in general. For these reasons, an introduction to technology education (engineering and technological design) is a part of the technological literacy standards.

Standards and Strands

There are two technological literacy standards, each of which has a number of lettered strands. The standards and strands include:

8.1 Information Technology

A. Basic Computer Tools and Skills

B. Application of Productivity Tools
- Social Aspects
- Information Access and Research
- Problem Solving and Decision Making

8.2 Technology Education

A. Nature and Impact of Technology
B. Design Process and Impact Assessment
C. Systems in the Designed World

References

American Association of School Librarians: Information Literacy Standards for Student Learning (AASL, 1998)

Arizona Department of Education: Technology Education Standards (Arizona, 2000).

International Society for Technology in Education: National Educational Technology Standards for Students (ISTE, 1998).

Standards for Technological Literacy (STL): Content for the Study of Technology (ITEA, 2000).

STANDARD 8.1 (INFORMATION TECHNOLOGY) ALL STUDENTS WILL USE TECHNOLOGY SKILLS AND TOOLS TO GATHER AND ORGANIZE INFORMATION AND TO SOLVE PROBLEMS.

Descriptive Statement: Students will use technology tools and applications to conduct research, solve problems, improve learning, and produce products and presentations in conjunction with standards in all areas. They will also develop the ability to summarize, organize, synthesize, and evaluate information for life long learning.

Cumulative Progress Indicators

By the end **of Grade 4**, students will:

A. Basic Computer Skills and Tools

1. Use basic technology vocabulary.
2. Input and access text and data using proper keyboarding techniques.
3. Produce a simple finished document using word process software.
4. Produce and interpret a simple graph or chart by entering and editing data on a prepared spreadsheet template.
5. Create and present an electronic presentation using appropriate software.

B. Application of Productivity Tools

Social Aspects

1. Recognize and practice responsible social and ethical behaviors when using information technology, and understand the consequences of inappropriate use.
2. Practice appropriate Internet etiquette.
3. Recognize the ethical implications of plagiarism of print, non-print and software copyrights.
4. Identify the personal security and safety issues related to technology use.

Information Access and Research

5. Recognize the need for accessing and using information.
6. Understand that all information may not be valid.
7. Identify and use web browsers, search tools and catalogs to obtain information.
8. Obtain, rephrase, and communicate information.

Problem Solving and Decision Making

9. Solve problems individually and/or collaboratively using information technology.

Building upon knowledge and skills gained in preceding grades, by the end of Grade 8, students will:

A. Basic Computer Skills and Tools

1. Create and maintain files and folders.

2. Create a multi-page document with citations using word processing software in conjunction with other tools that demonstrate the ability to format, edit, print, and perform back-up procedures.
3. Develop the ability to troubleshoot basic hardware problems.
4. Design a word processing document containing graphics.
5. Construct a spreadsheet, enter data, create graphs and interpret the information.
6. Design and produce a basic multimedia project or web page using multiple digital sources.
7. Use network resources for storing and retrieving data.

B. Application of Productivity Tools

Social Aspects

1. Explain the purpose of an Acceptable Use Policy and the consequences of inappropriate use of technology.
2. Describe and practice safe Internet usage.
3. Describe and practice "netiquette" when using the Internet and electronic mail.

Information Access and Research

4. Choose appropriate tools and information resources to support research, including:
   - On-line resources and databases
   - Search engines and web directories
5. Evaluate the accuracy, relevance, and appropriateness of print and non-print electronic information sources.

Problem Solving and Decision Making

6. Determine when technology tools are appropriate to solve a problem and make a decision.

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Building upon knowledge and skills gained in preceding grades, by the end of Grade 12, students will:

A. Basic Computer Skills and Tools

1. Create documents using professional format including a resume and a business letter.
2. Construct a spreadsheet, enter data, use mathematical functions to manipulate and process data, generate charts and graphs, and interpret the results.
3. Plan and create a database, define fields, input data from multiple records, produce a report using sort and query, and interpret data.
4. Produce a multimedia project using text, graphics, moving images, and sound.
5. Produce and edit page layouts in different formats using desktop publishing and graphics software.
6. Develop a document or file for inclusion into a website or web page.
7. Merge information from one document to another.

B. **Application of Productivity Tools**

Social Aspects

1. Make informed choices among technology systems, resources and services in a variety of contexts.
2. Exhibit legal and ethical behaviors when using computer and information technology, and discuss consequences of misuse.
3. Demonstrate sensitivity in communicating with diverse audiences using computer and information technology.

Information Access and Research

4. Select and use specialized databases for advanced research.
5. Evaluate the accuracy, relevance, and appropriateness of electronic information sources.
6. Integrate new information into existing knowledge base and communicate the results in a project or presentation.

Problem-Solving and Decision Making

7. Identify a problem in a content area and formulate a strategy to solve the problem using brainstorming, flowcharting and appropriate resources.
8. Independently select appropriate electronic resources from school, community and the world (via online) to be used to locate information needed when presented with a problem to solve.

STANDARD 8.2 (TECHNOLOGY EDUCATION) ALL STUDENTS WILL DEVELOP AN UNDERSTANDING OF THE NATURE AND IMPACT OF TECHNOLOGY, ENGINEERING, TECHNOLOGICAL DESIGN, AND THE DESIGNED WORLD AS THEY RELATE TO THE INDIVIDUAL, SOCIETY, AND THE ENVIRONMENT.

Descriptive Statement: The following indicators are based on the Standards for Technological Literacy (STL, 2000) and support the National Academy of Engineering (2002) call for students to gain technological literacy. Students will be expected to understand the various facets of technology and the design process. They will analyze and evaluate design options and then apply the design process to solve problems. A systems perspective is employed to emphasize the interconnectedness of all knowledge and the impact of technology and technological change. Students will be expected to use technology as it applies to physical systems, biological systems, and information and communication systems. **K-7 indicators are included as part of the Science Standard 5.4: Nature and Process of Technology.**

Cumulative Progress Indicators

By the end of **Grade 8,** students will:

A. Nature and Impact of Technology

1. Describe the nature of technology and the consequences of technological activities.
2. Describe how components of a technological product, system, or environment interact.
3. Describe how one technological innovation can be applied to solve another human problem to enhance human life or extend human capability.
4. Explain how technological activity has an affect on economic development, political actions, and cultural change.

B. Design Process and Impact Assessment

1. Analyze products and systems to determine how the design process was applied to create the solution.
2. Identify a technological problem, gather and analyze data, and use the design process to create an appropriate solution.
3. Describe how variations in resources such as time, people, energy, tools, materials, information, money, and space can affect solutions to a technological problem.
4. Use appropriate tools and materials safely in analyzing, designing, modeling, or making a technological product, system, or environment.

C. Systems in the Designed World

1. Explain technological advances in medical, agricultural, energy and power, information and communication, transportation, manufacturing, and construction technologies.
2. Explain reasons why human-designed systems, products, and environments need to be monitored, maintained, and improved to ensure safety, quality, cost efficiency, and sustainability.
3. Explain the functions and interdependence of subsystems such as waste disposal, water purification, electrical, structural, safety, climatic control and communication.

Building upon knowledge and skills gained in preceding grades, by the end of **Grade 12,** students **electing courses** in technology education will:

A. Nature and Impact of Technology

1. Discuss the costs, benefits, trade-offs, and risks related to the use of technologies using appropriate data.
2. Explain how technological development is affected by competition through a variety of management activities associated with planning, organizing and controlling the enterprise.
3. Provide various examples of how technological developments have shaped human history.

B. Design Process and Impact Assessment

1. Analyze a given technological product, system, or environment to understand how the engineering design process and design specification limitations influenced the final solution.
2. Evaluate the function, value, and appearance of technological products, systems, and environments from the perspective of the user and the producer.
3. Develop methods for creating possible solutions, modeling and testing solutions, and modifying proposed design in the solution of a technological problem.
4. Use sophisticated computer assisted design systems to develop an appropriate design solution.
5. Diagnose a product and system that is malfunctioning, using appropriate critical thinking methods for troubleshooting.

C. Systems in the Designed World

1. Explain the life cycle of a product, from initial design to reuse, recycling, remanufacture, or final disposal, and its relationship to people, society, and the environment.
2. Analyze the factors that influence design of technological products and systems such as function, appearance, culture, convenience, value, economic principles, sustainability, and governmental regulations.
3. Compare and contrast the effectiveness of various products, systems, and environments associated with technological activities related to energy, transportation, manufacturing, information and communication.